IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re:	Steve Barhorst	Confirmation No:	8366
Serial No:	10/804,913	Group:	1725
Filed:	March 19, 2004	Examiner:	Tran, Len
For:	Metal-Core Gas Metal Arc Welding of Ferrous Steels with Noble Gas Shielding		
Customer No.:	29127		
Attorney Docket No.	22176.23		

APPELLANT'S BRIEF

Commissioner for Patents
P.O. Box 1450,
Alexandria, Virginia 22313-1450

Sir:

This is the Applicants' appeal from the final Office Action, mailed February 7, 2007 (Paper No. 20070204).

Real Party in Interest

The real party in interest is Hobart Brothers Company.

Related Appeals and Interferences

There are no related appeals or interferences.

Status of Claims

Claims 1-3 and 37-41 are pending in this application. Claims 4-36 were withdrawn. Claims 1-3 and 37-41 are rejected. The rejection of claims 1-3 and 37-41 is being hereby appealed.

Status of Amendments

All amendments have been entered. There were no post final amendments or proposed amendments.

Summary of Claimed Subject Matter

Claim 1 is directed to a method for gas-metal arc welding of ferrous alloys (Paragraph [0001]). The method comprises feeding a consumable metal-core electrode into a gas-metal arc welding apparatus, the metal-core electrode having a sheath and a core characterized by a core composition (Paragraph [0010]). The method further comprises using Ar to form a non-oxidizing shielding atmosphere around the consumable metal-core electrode (Paragraph [0001], [0008]). The method further comprises igniting an arc between a ferrous alloy work piece and the consumable metal-core electrode to weld a carbon steel, low alloy steel or ferritic stainless steel work piece in the non-oxidizing shielding gas atmosphere (Paragraph [0010]).

Claim 2 is directed to the method as in Claim 1, wherein the non-oxidizing atmosphere of Ar comprises less than 1 % of a residual amount of N_2, N_2O_5, O_2 or CO_2 (Paragraph [0008]).

Claim 3 is directed to the method as in Claim 1, wherein the core comprises up to 45% wt of a metal powder and wherein an iron powder comprises up to 44% wt of the core composition (Paragraph [0035], [0005]).

Claim 37 is directed to the method of Claim 1, further comprising producing a weld metal comprising a percentage of oxygen in the weld metal not exceeding 0.06% wt (Paragraph [0010]).

Claim 38 is directed to the method of Claim 37, wherein the core composition of the metal-core wire comprises oxygen (Paragraph [0043]).

Claim 39 is directed to the method of Claim 1, in which a fume generation rate does not exceed 0.25 gms/min (Paragraph [0010]).

Claim 40 is directed to the method of Claim 1, wherein stability of the arc is characterized by a standard deviation within the range from about 0.2 V to about 0.3 V (Paragraph [0010], 0047]) .

Claim 41 is directed to the method of Claim 1, wherein a toughness of a weld metal at 0 F of at least about 50 ft-lb at 0° F and at least about 41 ft-lb at -20° F (Paragraph [0010]).

Grounds of Rejection to be Reviewed on Appeal

I. Whether claims 1-3 are obvious under 35 U.S.C. 103(a) over Gault (US 6,303,891), and further in view of Marshall et al. (US 4,800,131).

II. Whether claims 37 -41 are obvious under 35 U.S.C. 103(a) over Gault (US 6,303,891), and further in view of Marshall et al (US 4,800,131), in view of Church (US 4,463,243).

Argument

I. With regard to Issue I on appeal, Applicant argues as follows.

In the final Office Action the Examiner wrote that "Gault discloses the method for GMAW for ferrous alloy comprising the steps of feeding a consumable electrode into a GMAW apparatus, using Argon as the shielding gas and ***less that 1% of Nitrogen, since Nitrogen is not present in the gas*** (abstract), then igniting an arc between the ferrous alloy workpiece and the electrode."

Applicants respectfully refer the attention of the Board to Claim 1 and point out that it is directed to "using Ar to form a non-oxidizing shielding atmosphere around the consumable metal-core electrode". The important feature of that claim element is using Ar as a non-oxidizing shielding gas. It is impossible to understand how the Examiner's statement about there being less that 1% of Nitrogen in the shielding gas, because Nitrogen is not even present in the gas, is relevant to Claim 1, or how it proves anything at all. Most of the periodic table elements are also not present in the Ar based non-oxidizing shielding gas of the present invention.

Abstract of the Gault patent, cited by the Examiner, says that "[A] universal shielding gas mixture contains, by volume, about 96.0% argon, 3.0% carbon dioxide, and 1% oxygen." The Abstract also says that "[I]n a second embodiment , suitable for use with carbon steel materials but not stainless steel, the shielding gas mixture contains, by volume, about 95.0% argon, 3.0% carbon dioxide, and 2.0% oxygen." Therefore, the shielding gas in the Gault patent has at least 4% of the oxidizers in the first embodiment and at least 5% of the oxidizers. There is absolutely nothing in the Gault patent that would prompt anyone to suggest that Gault's shielding gases are non-oxidizing, or that it has ever been intended to use them as non-oxidizing gases. In fact, the opposite is true – in such welding arrangements as Gaults' the shielding atmosphere had to be oxidizing to stabilize the arc.

Contrary to the disclosure in the Gault patent cited by the Examiner, the present invention as claimed in Claim 1 calls for using Ar to form a non-oxidizing shielding gas. As defined by Applicants in the specification, the term "non-oxidizing" means that the shielding gas is either a pure noble gas having a commercially available degree of purity, or a shielding noble gas with the remaining concentration of oxidizers less than 1 % (Paragraph [0008]). The concentration of oxidizers (4% and 5%, respectively) in the Gault patent is much higher than that of the concentration of the possible remaining oxidizing gases in the noble gas shielding mixture claimed in Claim 1. The shielding mixture in the Gault patent is a well known oxidizing shielding gas. The Gault patent contains the disclosure which is contrary to the present invention of using a non-

oxidizing noble gas shielding mixture to work with metal core wires, claimed in Claim 1. Therefore, the Examiner's statement in the final Office Action that the Gault patent discloses the method of Claim 1 except for "the core having a sheath with metal powder up to 44%..." in incorrect. The Gault patent fails to teach the element of "using Ar to form a non-oxidizing shielding atmosphere around the consumable metal core electrode". Therefore, the rejection of Claim 1 over the Gault patent under 35 U.S.C. 103(a) has been incorrectly made and should be reversed and Claim 1 be moved to allowance.

With regard to Claim 2, Applicants assert that the Gault patent doesn't disclose the elements of that Claim either. Claim 2 specifies that the non-oxidizing shielding gas contains less than 1% of a residual amount of N_2, N_2O_5, O_2 or CO_2. The amount of O_2 and CO_2 in Abstract of the Gault patent is cited as 4% and 5%. Table 1 in that patent lists the relevant percentages of oxidizers as 5%, 8%, 15-20%, 25%, 2%. In all examples in the specification of the Gault patent the percentage of oxidizers is greater or equal at least 2%. Nothing in that patent discloses a noble gas shielding atmosphere with less that 1% of oxidizing gases. Evidently, the Gault patent cited by the Examiner does not disclose the non-oxidizing shielding gas containing less than 1% of a residual amount of N_2, N_2O_5, O_2 or CO_2. Therefore, the rejection of Claim 2 over the Gault patent 35 U.S.C. 103(a) was incorrectly made and should be reversed and Claim 2 be moved to allowance.

Claim 3 is directed to the method as in Claim 1, wherein the core comprises up to 45% wt of a metal powder and wherein an iron powder comprises up to 44% wt of the core composition. The Examiner wrote in the final Office Action that "Marshall et al. discloses using a metal-core having a sheath for the purpose of improving bead appearance and joint quality (abstract)." The Examiner further wrote that "Marshall et al. does not teach powder weight percentages. However, Marshall mentions the diameter range and the powder composition. Therefore it would have been obvious to use 44% wt of powder, since the amount would depend on the weld quality desired."

Applicant respectfully asserts that the logic in the above-cited quotes seems to be almost impossible to comprehend. It is completely unclear how one would use the diameter values and find it obvious that an iron powder comprises up to 44% wt of the core composition, as claimed in Claim 3. A closer examination of the Marshall patent reveals that nothing like that has ever been contemplated by that patent.

Specifically, Example 1 in the Marshall patent says that "the core wire was a solid wire comprising 99% nickel" (Col. 2, lines 52-53), which has nothing to do with the percentage of iron powder in the core. Example 2 says discloses "[A] mild steel strip having dimensions of about 0.04.times.0.6 inches was enclosed about a nickel wire having a 0.06 inch diameter and about 17% granular chromium powder, based upon the total wire weight." (Col. 3, lines 23-26). Example 3 says that "[T]he iron wire was 98% pure" (Col. 3, line 41). Example 4 says that the core has "a nominal composition of 70% nickel – 30% copper and was made in accordance with our invention" (Col. 3, lines 57-59). Example 5 says that "the core wire was formed from a nickel strip having dimensions of 0.01x 0.4 inches, filled with 98% chromium metal powder…" (Col. 4, lines 13-16). Example 6 says that " [T]he core wires were 0.030 inch diameter aluminum and 0.090 inch diameter nickel wires. Nickel powder fill material was added in an amount up to 12% by weight of the total composite wire" (Col. 4, lines 34-38).

As follows from the disclosure of the Marshall patent, the wires in Examples 1, 2, 3, 5, and 6 don't even have iron in their cores, so their diameters and dimension are not relevant, since they don't change anything in the compositions of the core. The wire in Example 3 had a 98% pure solid iron core, which is not what is claimed in Claim 3 of the present invention.

Therefore, the combination of the Gault and Marshall patents does not disclose each and every element of the invention as claimed in Claim 3. Applicants request that the rejection of Claim 3 be reversed and Claim 3 be moved to allowance.

II. With regard to Issue II on appeal, Applicant argues as follows.

Claim 37 is directed to the method of Claim 1, further comprising producing a weld metal comprising a percentage of oxygen in the weld metal not exceeding 0.06% wt. Dependent Claim 38 is directed to the method of Claim 37, wherein the core composition of the metal-core wire comprises oxygen.

The Examiner combined the Gault, Marshall and Church patents to support the assertion that "it would have been obvious to an ordinary skill in the art at the time applicant's invention was made to have oxygen content less than 0.06%, since it would depend on the metals to be weld."

Applicants respectfully assert that the portion of the Church patent cited by the Examiner (Col. 7, line 62- Col. 8, line 17) has nothing to do with Claim 37. That portion of the Church patent has to do with the shielding gas and the content of oxygen in the shielding gas, not in the resulting weld metal, as claimed in Claim 37. Therefore, the cited portion of the Church patent is irrelevant to what's claimed in Claim 37. Therefore, the combination of the Gault, Marshall and Church patents does not disclose the elements of Claim 37. Applicants request that the rejection of Claim 37 be reversed and Claim 37 be moved to allowance. For the same reasons rejection of Claim 38 should be reversed.

Claim 39 is directed to the method of Claim 1, in which a fume generation rate does not exceed 0.25 gms/min. Claim 40 is directed to the method of Claim 1, wherein stability of the arc is characterized by a standard deviation within the range from about 0.2 V to about 0.3 V. Claim 41 is directed to the method of Claim 1, wherein a toughness of a weld metal at 0 F of at least about 50 ft-lb at 0^{o} F and at least about 41 ft-lb at -20^{o} F.

Similarly to the statements presented by the Examiner with regard to Claims 37 and 38, the Examiner's statements that "it would have been obvious to have fume generation not exceeding 0.25 gms/min, arc with standard deviation of 0.2V to 0.3V, and toughness of weld at 0F at least 50ft-lb and 41 ft-lb at -20 F, since based on Church's disclosure that gas mixture will depend on the metal and alloys" is completely baseless and makes no sense. There is nothing in the combination of the cited patents that even remotely describes the fume generation rate, the stability of the arc and the toughness of the weld metal in the welding process that is claimed in independent Claim 1 and in its dependent Claims 39, 40, and 41, respectively. These cited statements made in the final Office Action are some conjured up conclusions with no relevance to what is actually disclosed or not disclosed in the cited combination of patents. For these reasons the rejection of Claims 39, 40 and 41 should be reversed and the Claims should be moved to allowance.

For the foregoing reasons, Applicants believe that the pending rejections should be reversed, and that the present application should be passed to issue. Should any questions arise, please contact the undersigned.

Respectfully submitted,

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Claims Appendix

1. (Previously presented) A method for gas-metal arc welding of ferrous alloys comprising:

feeding a consumable metal-core electrode into a gas-metal arc welding apparatus, the metal-core electrode having a sheath and a core characterized by a core composition;

using Ar to form a non-oxidizing shielding atmosphere around the consumable metal-core electrode; and

igniting an arc between a ferrous alloy work piece and the consumable metal-core electrode to weld a carbon steel, low alloy steel or ferritic stainless steel work piece in the non-oxidizing shielding gas atmosphere.

2. (Previously Amended) The method of Claim 1, wherein the non-oxidizing atmosphere of Ar comprises less than 1 % of a residual amount of N_2, N_2O_5, O_2 or CO_2.

3. (Previously Amended) The method of Claim 1, wherein the core comprises up to 45% wt of a metal powder and wherein an iron powder comprises up to 44% wt of the core composition.

4. (Withdrawn) A method for gas-metal arc welding of ferrous alloys comprising using a noble single element gas as a shielding gas and a metal-core wire as a consumable electrode to weld a carbon steel, low alloy steel or ferritic stainless steel work piece wherein a percentage of oxygen in a weld metal does not exceed 0.06% wt.

5. (Withdrawn) The method of Claim 4, wherein the noble single element gas is Ar.

6. (Withdrawn) The method of Claim 5, wherein the noble single element gas comprises a residual amount of N_2, N_2O_5, O_2 or CO_2 not exceeding 1%.

7. (Withdrawn) The method of Claim 4, wherein the noble single element gas is selected from the group consisting of He, Ne, Rd and Xe.

8. (Withdrawn) The method of Claim ~~5~~ 4, wherein a core composition of the metal-core wire comprises oxygen.

9. (Withdrawn) A method for gas-metal arc welding of ferrous alloys comprising using a noble single element gas, as a shielding gas and a metal-core wire as a consumable electrode to weld a carbon steel, low alloy steel or ferritic stainless steel work piece wherein a fume generation rate does not exceed 0.25 gms/min.

10. (Withdrawn) The method of Claim 9, wherein the noble single element gas is Ar.

11. (Withdrawn) The method of Claim 10, wherein the noble single element gas comprises a residual amount of N_2, N_2O_5, O_2 or CO_2 not exceeding 1%.

12. (Withdrawn) The method of Claim 9, wherein the noble single element gas is selected from the group consisting of He, Ne, Rd and Xe.

13. (Withdrawn) A gas-metal arc welding of ferrous alloys comprising using a noble single element gas as a shielding gas and a metal-core wire as a consumable electrode to weld a carbon steel, low alloy steel or ferritic stainless steel work piece wherein stability of the arc is characterized by a standard deviation within the range from about 0.2 V to about 0.3 V.

14. (Withdrawn) The method of Claim 13, wherein the noble single element gas is Ar.

15. (Withdrawn) The method of Claim 14, wherein the noble single element gas comprises a residual amount of N_2, N_2O_5, O_2 or CO_2 not exceeding 1%.

16 (Withdrawn) A method for gas-metal arc welding of carbon steel comprising using a noble single element gas as a shielding gas and a metal-core wire as a consumable electrode to weld a carbon steel work piece wherein a toughness of a weld metal at 0 F of at least about 50 ft-lb at 0^o F and at least about 41 ft-lb at -20^o F.

17. (Withdrawn) The method of Claim 16, wherein the noble single element gas is selected from the group consisting of Ar.

18. (Withdrawn) The method of Claim 17, wherein the noble single element gas comprises a residual amount of N_2, N_2O_5, O_2 or CO_2 not exceeding 1%.

19. (Withdrawn) A method of producing a weld comprising using a noble single element

shielding gas in a gas-metal arc welding process of welding a metal-core wire electrode on ferritic stainless steels.

20. (Withdrawn) The method of Claim 19, wherein the noble shielding gas is Ar.

21. (Withdrawn) The method of Claim 20, wherein the noble single element gas comprises a residual amount of N_2, N_2O_5, O_2 or CO_2 not exceeding 1%.

22. (Withdrawn) A method for gas-metal arc welding of ferrous alloys comprising:

feeding a consumable metal-core electrode into a gas-metal arc welding apparatus, the metal-core electrode having a sheath and a core characterized by a core composition;

using a mixture of noble gases selected from the group consisting of Ar, He, Ne, Rd and Xe to form a non-oxidizing shielding atmosphere around the consumable metal-core electrode; and

igniting an arc between a work piece and the consumable metal-core electrode to weld the carbon steel, low alloy steel or ferritic stainless steel work piece in the non-oxidizing shielding gas atmosphere.

23. (Withdrawn) The method of Claim 22, wherein the mixture of noble gases comprises residual amount of CO_2 and/or O_2 in concentrations not exceeding 1%.

24. (Withdrawn) The method of Claim 22, wherein the mixture of noble gases further comprises N_2 and/or N_2O_5 in concentrations not exceeding 2%.

25. (Withdrawn) The method of Claim 22, wherein the core comprises up to 45% wt of

a metal powder and the iron powder comprises up to 44% wt of the core composition.

26. (Withdrawn) A method for gas-metal arc welding of ferrous alloys comprising using a mixture of noble gases, selected from the group consisting of Ar, He, Ne, Rd and Xe, as a shielding gas and a metal-core wire as a consumable electrode to weld a carbon steel, low alloy steel or ferritic stainless steel work piece wherein a percentage of oxygen in a weld metal does not exceed 0.06% wt.

27. (Withdrawn) The method of Claim 26, wherein the mixture of noble gases comprises a residual amount of N_2, N_2O_5, O_2 or CO_2 not exceeding 1%.

28. (Withdrawn) The method of Claim 26, wherein a core composition of the metal-core wire comprises oxygen.

29. (Withdrawn) A method for gas-metal arc welding of ferrous alloys comprising using a mixture of noble gases, selected from the group consisting of Ar, He, Ne, Rd and Xe, as a shielding gas and a metal-core wire as a consumable electrode to weld a carbon steel, low alloy steel or work piece wherein a fume generation rate does not exceed 0.25 gms/min.

30. (Withdrawn) The method of Claim 29, wherein the mixture of noble gases comprises a residual amount of N_2, N_2O_5, O_2 or CO_2 not exceeding 1%.

31. (Withdrawn) A method for gas-metal arc welding of ferrous alloys comprising using a mixture of noble gases, selected from the group consisting of Ar, He, Ne, Rd and Xe, as a shielding gas and a metal-core wire as a consumable electrode to weld a carbon steel, low alloy steel or ferritic stainless steel work piece wherein stability of the arc is characterized by a standard deviation within the range from about 0.2 V to about 0.3 V.

32. (Withdrawn) The method of Claim 31, wherein the mixture of noble gases comprises a residual amount of N_2, N_2O_5, O_2 or CO_2 not exceeding 1%.

33. (Withdrawn) A method for gas-metal arc welding of ferrous alloys comprising using a mixture of noble gases, selected from the group consisting of Ar, He, Ne, Rd and Xe, as a shielding gas and a metal-core wire as a consumable electrode to weld a carbon steel work piece wherein a toughness of a weld metal at 0 F of at least about 50 ft-lb at 0^o F and at least about 41 ft-lb at -20^o F.

34. (Withdrawn) The method of Claim 33, wherein the mixture of noble gases comprises a residual amount of N_2, N_2O_5, O_2 or CO_2 not exceeding 2%.

35. (Withdrawn) A method of producing a weld comprising using a mixture of noble gases, selected from the group consisting of Ar, He, Ne, Rd and Xe, in a gas-metal arc welding process of welding a metal-core wire electrode on carbon steel.

36. (Withdrawn) The method of Claim 35, wherein the mixture of noble gases comprises a residual amount of N_2, N_2O_5, O_2 or CO_2 not exceeding 2%.

37. (Previously presented) The method of Claim 1 further comprising producing a weld metal comprising a percentage of oxygen in the weld metal not exceeding 0.06% wt.

38. (Previously presented) The method of Claim 37, wherein the core composition of the
metal-core wire comprises oxygen.

39. (Previously presented) The method of Claim 1, in which a fume generation rate does not exceed 0.25 gms/min.

40. (Previously presented) The method of Claim 1, wherein stability of the arc is characterized by a standard deviation within the range from about 0.2 V to about 0.3 V.

41. (Previously presented) The method of Claim 1, wherein a toughness of a weld metal at 0 F of at least about 50 ft-lb at 0^o F and at least about 41 ft-lb at -20^o F.

Evidence Appendix

None

Related Proceedings Appendix

None